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[The Association as a body is not responsible for statements or opinions of any of its members.]

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THE MASSACHUSETTS ASSOCIATION OF BOARDS OF HEALTH was organized in Boston in March, 1890, with the following objects: the advancement of sanitary science in the Commonweaith of Massachusetts, the promotion of better organization and co-operation in the local Boards of Health, and the uniform enforcement of sanitary laws and regulations.

THE JOURNAL OF THIS ASSOCIATION has, for thirteen years, faithfully reflected the views of the public hygienists of Massachusetts

As the only one of its kind in Massachusetts, the Journal so far has had its own field, which, however, it has not yet fully occupied. To take more complete advantage of the available opportunities, some expansion has been determined upon. The outcome is shown in this, the first, issue in the new form. If the general high level reached in the past can be maintained in the future, the chief object of the new management will be accomplished.

We hope that our readers will be moved to show appreciation of this effort by aiding in the expansion of the subscription list, which is open to non-members, as well as to members, of the Association.

EDITORIALS.

THE MILK SUPPLY OF LARGE CITIES. Mr. H. E. Atwood, Chief of the Dairy Division of the U. S. Dept. of Agriculture, has recently published a very interesting document relating to the milk supply of the cities of the United States.*

* The Milk Supply of Two Hundred Cities and Towns. By H. E. Atwood, C. E., and R. A. Pearson, M. S., Washington. Government Printing Office, 1903.

The salient points shown in this report are the decided progress made in recent years in the matter of improving the milk supply of the people, the adoption of systematic methods of inspecting milk in all large cities, greater cleanliness in milking and the care of milk, and the introduction of glass bottles or jars for the purposes of distribution.

So far as Massachusetts is concerned the evolution of milk legislation has not differed from that of other important questions affecting the life and health of the people. The economic or financial view has too often been allowed to influence legislation, rather than the sanitary or life-saving view. When it was proposed to repeal the existing protective law in regard to water-gas in 1890, Addicksism finally triumphed in Massachusetts as it has since done in Delaware, and as a consequence the deaths from gas poisoning have increased more than ten-fold, as had been predicted. The present milk laws of Massachusetts are protective against fraud, and, economically considered, are excellent statutes, but they do not accomplish the object which is of much greater importance, viz.: a strict supervision of the methods of production, and inspection of all dairy farms regularly and systematically carried out, with a view to securing absolutely cleanly methods of milk production and distribution, including the exclusion of all persons suffering with infectious diseases, either acute or chronic, from all connection with dairy work. The powers of a milk inspector are limited by the boundary lines of his own city or town, and he is therefore compelled to give attention to the quality of the milk as it arrives at its destination. There should be, therefore, some other power or authority conferred by law which would enable an official to visit every dairy farm which contributes to the city milk supply, and to compel producers to adopt such sanitary measures as might be found necessary. This is far more important than the mere analysis of milk for the purpose of detecting commercial frauds. Unfortunately for Massachusetts, a large part of its present milk supply comes from other States, and radical improvement in the direction we have indicated would necessitate the co-operation of the sanitary authorities in such other States.

City.	Population, Census of 1900.	Average Daily Milk Consumption.		Milk Stores.	Milk Wagons.	Portion Ship'd by Rail.	Production of Milk Within City Limits.			Dairies Outside City		Retail Price Milk per Qt		Milk Standard.		Cost of Inspection.	Samples Analyzed Last Year.
		Total.	Per Cap.				Herds	Cows.	H'ds Insp. Last Year.	Total.	Insp'd Last Yr.	Summer	Winter.	Slds.	Fats.		
		GALS.	PINTS			%						CTS.	CTS.			$	
New York City .	3,437,202	333,856	.78	12,000	4,000	85	5500	23,200	560	3500	. .	6	8	12	3	. . .	79,657
Chicago	1,698,575	169,465	.80	2,162	2,692	97	30	420	30	4000	11	5–7	6–7	12	3	10,000	19,053
Philadelphia . .	1,293,697	75,000	.46	1,500	2,000	75	500	5,000	500	2500	. .	6	8	12	3.5	9,580	47,118
St. Louis . . .	575,238	26,375	.37	1,987	1,109	. .	400	8,000	350	119	. .	5–8	5–8	11.5	3	1,850	684
Boston	560,892	82,250	1.17	2,900	506	75	126	739	126	. .	. .	5–8	5–8	13 12	3.7 3	13,000	15,000
Baltimore . . .	508,957	25,000	.39	2,530	525	. .	539	3,314	539	1500	220	5–10	5–10	12	3	2,300	32,703
Worcester . . .	118,421	16,500	1.11	400	350	1	340	4,036	316	568	. .	5½	5½	Same as Boston	Same as Boston	1,000	1,400
Fall River . . .	104,863	6,000	.46	327	320	. .	105	350	105	240	240	5–6	6–7			1,250	257
Lowell	94,969	7,700	.65	350	156	4	. .	100	. .	. .	. .	5	6			2,329	2,972
Cambridge . . .	91,886	9,074	.79	410	156	53	76	234	76	500	. .	4–8	5–9			1,500	3,367
Lynn	68,513	6,000	.70	350	75	67	60	350	60	800	. .	4–7	4–7			2,500	. . .
Lawrence . . .	62,559	6,000	.76	700	200	. .	8	130	8	. .	. .	6	6			350	179
New Bedford . .	62,442	7,000	.90	201	170	. .	20	700	20	. .	. .	6	6			1,500	900
Springfield . . .	62,059	4,750	.61	103	133	. .	20	130	. .	420	. .	6	6			100	. . .
Somerville . . .	61,643	7,640	.99	300	185	87	2	62	2	. .	. .	6	7			500	575
Holyoke	45,712	4,373	.77	172	136	. .	78	858	78	300	. .	5	6			500	260
Brockton . . .	40,063	3,200	.64	150	150	. .	41	584	41	20	20	6	6			100	25

In thirty-five States laws now exist referring to the sale of milk. In several other States and Territories there are also food laws which relate to milk. In twenty-six States there are officials whose duty it is to enforce these laws.

In nearly all of the cities having a population of more than 50,000 there is some supervision of the milk supply, but in the smaller cities and towns such supervision is the exception and not the rule.

In addition to the very full tables which give much information as to the milk supply of cities and the extent of supervision, there are several appendices giving the ordinances of different cities, rules, regulations, and blank forms.

In two or three States and cities the sale of milk produced by cows fed upon ensilage is forbidden, and in commenting upon the fact, the compiler refers to ensilage as "a most excellent dairy feed"—a term with which we cannot fully agree.

From the standpoint of the milk-producer in the neighborhood of large cities, whose hayfields are of limited extent, ensilage appears necessary to supplement a deficiency in fodder for his cows and to enable them to yield an abundant flow of milk, but from the standpoint of the physician, and especially from that of the specialist in the care of infants, the use of fermented foods for the production of milk does not appear to be a settled question. So long as infant mortality continues to play an important part in the death-rate of cities, it would seem proper to advise for the nourishment of children who are fed from the bottle the milk of cows fed upon good hay and grain and such other food as nature has provided.

The introduction of glass jars for the delivery of milk and cream appears to have been quite general in nearly all large cities in recent years.

From the very full tables presented in this valuable report, we have selected the principal items relating to the milk supply of large cities (having over 500,000 in each) and have added those which relate to a number of Massachusetts cities and towns.

The largest per capita consumption of milk appears to be found in northern cities: Elizabeth, N. J., 2 pints per capita; Pueblo,

Col., 1.4 pints; Newton, Mass., 1.25; Hoboken, N. J., 1.21; Mt. Vernon, N. Y., 1.18; Boston, 1.17; Fitchburg, 1.15; Worcester, 1.11; New York City, .78; Chicago, .80. On the other hand, in southern cities the milk consumption is very small: New Orleans, .27; Montgomery, Ala., .14; Atlanta, Ga., .12; and Charleston, S. C., .10.

JULY (1903) QUARTERLY MEETING

OF THE

Massachusetts Association of Boards of Health.

The July meeting of the Massachusetts Association of Boards of Health was held at Gallop's Island, Boston Harbor, on Thursday, July 30. Dinner was served at 1.30 P. M., the members of the Association being the guests of the Boston Board of Health; and after dinner a business meeting was held under the presidency of Dr. H. P. Walcott.

The records of the April meeting were read and approved.

Members were elected as follows, upon the recommendation of the Executive Committee:

J. Arnold Rockwell, M. D., of Cambridge.

Goodwin A. Isenberg, of Cambridge.

Roswell Wetherbee, M. D., of Cambridge.

Charles F. Whiting, of Cambridge.

E. B. Phelps, of the Massachusetts Institute of Technology Sewage Experiment Station.

E. S. Hatch, M. D., of Brighton.

E. C. Newton, of Everett.

George W. S. Dockum, of Everett.

Edward A. McEttrick, of Brookline.

T. J. Daly, M. D., of Lawrence.

R. E. Brown, M. D., of Everett.

William H. Colbert, of Salem.

C. C. Crowley, of Clinton.

THE PRESIDENT—In accordance with the direction of the Association at the last meeting, I will appoint as the Committee

upon Legislation Mr. Pilsbury of Boston, Mr. Coffey of Worcester, and Dr. E. L. Fiske of Fitchburg.

Is there any other business to come before the Association at this time? If not, the regular business of the Association is in order. First is a paper upon "A Comparison of Some of the More Common Liquid Disinfectants," by Burt Ransom Rickards, Assistant Bacteriologist of the Boston Board of Health.

A COMPARISON OF SOME OF THE MORE COMMON LIQUID DISINFECTANTS.

BY BURT RANSOM RICKARDS, S. B.
Assistant Bacteriologist, Boston Board of Health Laboratory.

Any one who has had occasion to look over the literature relating to disinfecting solutions cannot help being impressed with the ambiguous and often contradictory statements made by different investigators on this subject. The reason for such a state of affairs lies in the different methods employed in performing the experiments and in the varying resistances of the different organisms used. Too often investigators are content with testing a disinfectant upon one or two different strains or races of the same species of organism, making very general deductions from the results thus obtained. Then again, sufficient care is not always taken to properly express the details of the experiment—for example, a writer using the term "a 1% formalin solution" without defining his use of the term formalin, leaves the reader very much in doubt as to the strength employed, since this term is often loosely used and may mean a 1% *formaldehyde* solution, which is two and one-half times the strength of a 1% solution of *formalin* made by diluting 1 cubic centimetre of a 40% commercial solution with 99 cubic centimetres of water.

Such facts have induced the writer to perform a series of experiments under certain very definite conditions in order that the results might be strictly comparable.

In testing disinfectants, there are three main factors to be considered,—the species of organism exposed, the length of time of exposure, and the strength of the disinfectant. To obtain com-

parable results on a number of disinfectants, two of these factors must remain constant, the other factor being varied. For the purposes of this paper, the bacillus of diphtheria was chosen as one of the constants, ten different races or strains, isolated from as many different typical cases, being employed to eliminate possible errors due to varying resistances of different races of the same species. The times of exposure were one, five, fifteen and thirty minutes. The strengths of the disinfecting solutions used were one and five per cent., made up by volume, except in the case of formaldehyde.

The following technique* was employed,—glass rods were fitted at one end with tapered cork stoppers, the corks being of such a diameter as to fit the test tubes tightly, and the rods of such length as to reach nearly to the bottoms of the tubes when the corks were in place. After being sterilized by dry heat, these rods were infected by first emulsifying a 24-hour agar growth of diphtheria in the water of condensation in the bottom of the tube and then dipping the end of each rod into this emulsion, finally touching the end of the rod to the side of the tube before withdrawing in order to remove any excess. A properly infected rod should show to the eye little if any film when dried, but should give a good growth on media. By using an emulsion in place of taking the growth directly from the agar, one obtains a much more uniform film of bacteria, and thus does away to a great extent with the previous objection to this method—that discordant results were obtained, due to an uneven distribution of the organisms. After infecting the ends of the rods, they were dried for about three hours in a sterile atmosphere, after which they were inserted into tubes containing the disinfectant for the chosen length of time. At the expiration of the time of exposure, the rods were withdrawn and plunged into tubes containing nutrient broth in order to wash off any traces of disinfectant still clinging to them. They were then rubbed carefully over the surface of agar, the tube being finally closed by tightly inserting the stopper, the lower end of the rod remaining in the water of condensation at the bottom of the tube. Both the broth used for

* Hill's Method, Journ. Amer. Pub. Health, Vol. XXIII.

washing and the agars were incubated at body temperature for ten days and were examined each day to detect any growth. This prolonged period of incubation is necessary in order to give any organisms whose growth has been merely checked, owing to their vitality having been lowered, a chance to recover and develop.

The writer wishes to state that, in his opinion, the slightest deviation in method is apt to vary the results obtained considerably. The method described above is not ideal, but it was rigidly adhered to and gives a good basis for comparison.

As regards the composition of the fluids tested, carbolic acid, solutions "A"* "B," "C," "D" and "F" are all coal tar products. Solution "D" is said to contain about 10% of cresols with a small quantity of carbolic acid. It gives a milky appearance with water. Solution "A" contains about 98% alpha naphthalene sulfonic acid, the remainder being phenol sulfonic acid and a small amount of hydrocarbons. It gives a dark-colored solution on dilution with water. Solutions "B," "C," and "F" are probably composed largely of cresols. They have a milky appearance on dilution.

Solution "G" is a 3 per cent. solution of hydrogen peroxide containing a very small amount of hydrochloric acid to render it stable. The solution, diluted for testing, contained therefore .03% and .15% of H_2O_2.

Solution "E" is a clear, watery solution composed largely of chloride of zinc with small amounts of the chlorides of aluminum and iron.

Solution "H" is a clear, watery solution. It is said to be made of saturated solutions of the chlorides of zinc, lead, calcium, aluminum, magnesium, potassium and sodium.

All of the above mentioned solutions were diluted to one and five per cent. by volume. In the case of formaldehyde, a commercial solution was first analyzed, and from the data thus obtained, one and five per cent. solutions were then made up by weight.

Chloride of lime was tested under the conditions given, but as it was impossible to verify the results obtained in time for this paper, they have been omitted purposely.

The percentages given in the tables are based on the number

* For obvious reasons letters have been substituted for the names of proprietary compounds in the printed article.

of infected rods which failed to give growth. For instance, a percentage of ninety means that nine of the ten rods, each of which was infected with a different race or strain of the same species, failed to show a growth even on ten days' incubation, after having been exposed to the disinfectant.

In examining the above tables, it should be borne in mind that the figures given must not be considered absolute, as one might regard a table of logarithms. Repeating the same work, using the same technique, one might obtain for carbolic (1%-1″) a percentage of 100 killed instead of 90, and for formaldehyde (1%-1″) a percentage of 10 killed instead of none killed, uncontrollable factors giving such a working error. The relative results, however, remain the same, and carbolic and formaldehyde would still stand in the same relative ratio as regards efficiency.

An examination of Table 1 shows that even a 1% solution of the coal-tar products tested kills the diphtheria bacillus in five minutes. When the strength is increased to five per cent., a much greater efficiency in one minute is obtained. Some of the disinfectants given in Table 2 are omitted in Table 1, their effect in a five per cent. solution not being sufficient to warrant a trial with a one per cent. solution. Certain minor discrepancies are apparent in these tables, an interrogation point being inserted after such discrepancy. These fall within the working error, however. The discrepancy between the one and five per cent. solution of Solution "A" is probably due to the fact that the original crude solution was rather unstable, some of the hydrocarbons precipitating between the time of the two tests.

An interesting fact brought out in Tables 1 and 2 is the relative inefficiency of formaldehyde solution as compared with carbolic acid solution. This is more strikingly illustrated by Table 3 which shows that this is true not only for the diphtheria bacillus but for the typhoid bacillus and staphylococcus pyogenes aureus. The results shown in this table would seem to indicate that the relative efficiency of different disinfectants tested by this method would remain the same no matter what organism they might be tested upon, although the actual time of exposure would of course vary according to the resistance of the particular organism.

TABLE No. 1.

Showing per cent. of Diphtheria Bacilli *killed* by a 1 per cent. Solution (by volume) of Disinfectant.

DISINFECTANT.	TIME OF EXPOSURE.			
	1 minute.	5 minutes.	15 minutes.	30 minutes.
	PER CENT.	PER CENT.	PER CENT.	PER CENT.
Carbolic Acid, pure	90	100	100	100
Carbolic Acid, crude . . .	90	100	100	100
Solution "A"	90	100	100	100
Solution "B"	40	100	100	100
Solution "C"	30	100	100	100
Solution "D"	10	100	. .	. .
Formaldehyde Solution (1% by weight)	0	0	50	80
Solution "E"	0	10 (?)	0	0

TABLE No. 2.

Showing per cent. of Diphtheria Bacilli *killed* by a 5 per cent. Solution (by volume) of Disinfectant.

DISINFECTANT.	TIME OF EXPOSURE.			
	1 minute.	5 minutes.	15 minutes.	30 minutes.
	PER CENT.	PER CENT.	PER CENT.	PER CENT.
Carbolic Acid, pure	100	100	100	100
Carbolic Acid, crude . . .	90	100	. .	. .
Solution "D"	90	100	100	100
Solution "B"	90	100	100	100
Solution "C"	80	100	100	90 (?)
Solution "A"	90	90	90	100
Solution "F"	10	90	100	100
Formaldehyde Solution (5% by weight)	10	60	100	100
Solution "G"	0	0	10	40
Solution "E"	0	0	10	10
Solution "H"	0	0	0	40

TABLE No. 3.

A comparison of the efficiency of 5 per cent. Solutions of Carbolic Acid and Formaldehyde on B.diphtheria, B.typhosus, and Staphylococcus pyogenes aureus.

ORGANISM.	Time of Exposure.	Carbolic Acid, 5 per cent. (vol.)	Formaldehyde 5 per cent. (wt.)
B.diphtheriæ	1 minute	100 per cent.	10 per cent.
Sta. py. aureus . . .	5 minutes	100 " "	10 " "
B.typhosus	1 minute	80 " "	0 " "

To summarize: Formaldehyde solution, or formalin, although commonly supposed to be superior to carbolic acid as a liquid disinfectant, is really much inferior in equivalent per centum solutions. This fact is all the more striking when one considers the high efficiency of formaldehyde as a gaseous disinfectant. It is also a most efficient deodorizer.

The coal tar proprietary compounds are, as a rule, very good disinfectants. They are not any better, however, than carbolic acid. Moreover, the composition of the proprietary articles may be varied, and the purchaser be none the wiser. Carbolic acid is preferable in all cases when its odor and properties are not objectionable.

The various colorless solutions put upon the market under fanciful names and advertised as "Chlorides," etc., are, as a rule, of little value as disinfectants, their cost usually increasing in inverse ratio to their efficiency.

THE PRESIDENT—The subject of this interesting paper is now before you for discussion, gentlemen, or for question, as may be.

PROF. CHARLES HARRINGTON—Mr. Chairman, I am very glad to have heard this very interesting paper, for I never have seen any figures demonstrating the true value of proprietary disinfectants when the periods of contact are short. Some four years ago, Dr Pearce and I reported to the Boston Society of Medical Sciences the results of our experiments with twelve proprietary and several other non-proprietary disinfectants, but our time of exposure was much longer, namely, two hours. As test objects we employed diphtheria membrane, cultures of the typhoid bacillus, typhoid stools, and tuberculous sputum. Even with the two-hour exposure, we found that not one of the proprietary preparations could be regarded as useful or reliable. I am much interested to learn that carbolic acid is so much more efficient than dilute solutions of formaldehyde in these short intervals, for our experiments led me to believe otherwise; that is to say, we found that formaldehyde in one per cent. solution was uniformly successful in sterilizing the stools, membranes and sputum, while five per cent. carbolic acid gave indifferent results. To be sure, our experiments were somewhat different in the matter of tech-

nique, which improves as time goes on. I think that all experiments along this line should be encouraged and made public, because the people at large are induced to buy these expensive proprietary compounds, which are inefficient and often worse than useless, when they can get a true disinfectant at a very small price.

THE PRESIDENT—Is there anything else to be said upon the subject of this paper? If not, the next paper in order is entitled: "The Mosquito Nuisance and How to Deal with It," and is by Mr. Underwood, our old friend.

THE MOSQUITO NUISANCE AND HOW TO DEAL WITH IT.

(With stereopticon views and specimens.)

BY WILLIAM LYMAN UNDERWOOD,

Lecturer at Massachusetts Institute of Technology.

Mr. President and Gentlemen:—Last June the Belmont Board of Health issued a pamphlet entitled "The Mosquito Nuisance and How to Deal with It." It was illustrated with photographs from life. Dr. Durgin, having seen this pamphlet, invited me to come here this afternoon and talk to you upon this subject. This is not the first time that this pamphlet has gotten me into trouble.

Unfortunately for the people of Belmont and the Belmont Board of Health, and unfortunately for the people in this section, we have been visited this summer by a most unusual plague of mosquitoes, something worse than we ever remember having before,—at least, I never remember anything like it, and it has gotten more or less of those who have been doing mosquito work into trouble. I venture to say that if you should ask any person in Belmont how the mosquitoes were this summer, he would tell you that they were very much thicker now that we know how to deal with them than they were when we were in ignorance, when all we knew was that when we saw a mosquito, we were to kill it. I suppose that other boards of health who have been trying to regulate the supply of mosquitoes have had

this same trouble. The supply has been very much larger than the demand.

We should not get discouraged, however, and when we are called up on the telephone and asked, "Why don't you come over to my place and do something about these mosquitoes?" "Are you doing anything? The mosquitoes are around my pond." "Why don't you petrolize here?" "Is there anything being done?" and this, that, and the other, we should keep our tempers any say, "Yes, something is being done, and if it were not for the fact that something were being done the mosquito plague would be ten times worse than it is." We should explain to them that we have had a most unusual summer, that it has been an exceptionally fine one for mosquitoes. In June we had long-continued rains, that formed puddles which afterwards became filled with mosquito "wigglers." Warm weather followed this wet period. You all remember the hot weather in July, and it is responsible for the thousands of mosquitoes that we are now having. Then, later, after the mosquitoes had deposited their eggs in these numerous puddles, and after the hot weather, we had more rain, and that made more puddles, and there were still more mosquitoes to lay their eggs in them. I am sorry to say so, but it seems to me that we are going to have still more mosquitoes during the latter part of this month and August. But we all want to keep right at work just the same.

It seems to me that a good way to deal with the mosquito problem, a good way for those towns that have not the money to put into a vigorous campaign of petrolizing and draining the different pools, is to begin a campaign of education; to get the people interested in the subject; to tell them all about the life history of the mosquito; to explain to them the different points about it, and to get people to work upon their own places themselves. Of course I think it is a very excellent thing, a fine thing, for Boards of Health to take up this work, and I think that every board that is able to do it, ought to do it. They ought to put kerosene upon the puddles and see that it is placed there frequently, at least every two weeks. There is no more reason why money should not be expended in this way than there is that it

should not be expended in taking away the garbage, the swill, or the ashes. Boards of Health should go on and drain all the places that they can drain, and do all that they are able to do, but they should also try to have the people informed on the subject of mosquito extermination.

In spite of all that has been written on the subject of mosquitoes, there are still a great many people in ignorance regarding their life history. It is rather strange to hear some people express their views on the subject. There are many popular theories that are all wrong. For instance, one of them is that mosquitoes breed in wet grass. We may go out early in the morning, and see thousands of mosquitoes coming up from the grass. We see them sometimes on our lawns. Some people think that they have bred there, but they have not; they have merely gone into the grass to seek the shelter that it affords from the wind, and they have also been attracted there by the moisture of the dew upon the grass; but they have not bred there. They must have water, actual water, in which to live during their early stages. There is a mosquito, *Culex sollicitans*, the typical Jersey mosquito, or the salt marsh mosquito, that does not require water in its first stage, that is, when it lays its eggs. This mosquito lays its eggs upon dry land, but water must come to them afterwards.

Another popular theory is that mosquitoes must have foul or stagnant water to breed in. This is not so. Mosquitoes will breed in the foulest water, and they will breed in stagnant water; they will also breed in the purest water. They don't necessarily have to have stagnant water in which to lay their eggs.

Another mistaken idea is that the mosquito only bites once, and that is not so at all. Mosquitoes may bite a great many times if they can get the chance to do so,—at least, the females may—the males never bite.

It is also a popular idea that a mosquito's life is a very short one. I am glad to say that a great many mosquitoes' lives are very short. Whenever I can I make the lives of those that I have anything to do with exceptionally short. But a great many mosquitoes' lives are not short. Many thousands of them live

over winter, and you will often find them if you look in your cellars. I had occasion to notice this fact very forcibly three or four years ago, when I was making some experiments upon mosquitoes. I had a good stock of larvæ in a glass jar in a refrigerator. One unfortunate day I opened the refrigerator door to get them, and out came the jar and everything with it onto the floor. That was the last of those "wigglers." I had planned many interesting things to do with them when they came to maturity, and I was crestfallen to lose the lot. Then I happened to remember that when I was a youngster, and was obliged to go into the cellar to do my photographic developing, on the dark-room ceiling there were thousands of mosquitoes during the winter; at least, I thought they were mosquitoes. I went over there at once, and found in the cellar, in the same place,—not the same mosquitoes, but others, hundreds of them, and I had no trouble in getting all that I wanted. People don't realize that many mosquitoes live through the winter in a state of hibernation.

The vast majority of mosquitoes never get any human blood for food. In its absence they live upon the blood of birds and frogs and other animals that sometimes frequent the marshes where they are born. In the absence of this food, they live upon the juices of tender aquatic plants.

Some three hundred different kinds of mosquitoes have already been described, and more are being found all the time. We have probably some fifty in this country, and these are divided into nine genera, or groups. I shall speak this afternoon of only two of these, because they are the ones that we have to deal with,—the group known as the *Anopheles*, which are the malarial mosquitoes,—the ones that are capable of conveying the plasmodium which causes malaria, and the *Culex*, the ordinary, everyday mosquito, of which we have thousands, and of which there are some twelve varieties that bother us.

Now if you will kindly close the doors. I am very sorry that we shall have to do this, because it may get a little warm in here, but this is a subject that we are liable to get warm over. I will promise to be just as brief as possible, and if any one feels

that he is going to faint and will say the word, we will suspend operations and open the doors and windows.

The life history of the mosquito is divided into four stages. Three of them are in the water, first the egg, then the larva, and then the pupa, the mosquitoes in these last two stages being commonly known as "wigglers." The mosquito seeks some very quiet pool in which to lay its eggs, and there deposits them. The majority of mosquitoes that vex and annoy us are bred near by, very often in our door-yards, or in the door-yard of some nearby neighbor. It is this point that I want to emphasize, and it is this point that the people ought to know, because every person should do all he can to co-operate in this good work of mosquito extermination. They can breed in old tin cans, in pools in the rocks, and in barrels where people keep manure-water to put upon the soil. I have found them in my own yard; I did not know that they were breeding there, but I found them in barrels which had been placed in the garden in which water was kept for the plants. They will breed in catch basins, in the foot tracks of the cows in the pasture, in gutters that don't properly run off the water on our roofs, and in fact in any place that will hold water, no matter how small a quantity, even if only a few ounces, if it is protected from the wind.

These photographs that I am going to show you, with the exception of two or three, which are taken from diagrams, are all photographs of live "wigglers," and live mosquitoes. I will explain them as we go along.

The first picture (exhibiting it by the stereopticon) shows you a typical egg mass of the ordinary, common mosquito, *Culex pungens*. It contains from 200 to 400 eggs, and it floats right on top of the surface of the water. It is very easy to see, and is about a quarter of an inch in length. In the course of a few days the bottoms come off these little eggs, and the little "wigglers" are released into the water. The whole length of time in favorable weather, such weather as we are having today, when it is very warm, is ten days from the time that the eggs are laid until the adult mosquito emerges from the water.

Now you will see how different the eggs of the *Anopheles*

are. (Exhibiting another picture.) These two pictures are diagrams. The *Anopheles* lays only from 40 to 100 eggs, and it does not lay them in rafts as does the *Culex*. Where it takes only ten days under favorable conditions for the *Culex* eggs to hatch into "wigglers" and ultimately into the adult mosquito, it takes twenty-four days for the *Anopheles*. These periods may be prolonged into weeks and even months by very cold weather.

The next picture is from life, as the ones that follow will be, and it shows you a typical mass of mosquito "wigglers." There are some *Anopheles* there, and some *Culex*, though many more *Culex* than *Anopheles*. I shall not stop to show you the difference between the two, because I can show it to you better in the pictures that are to follow. I have seen "wigglers" actually as thick as they are here in rain-water barrels and in ditches where farmers have been draining the land and have allowed the trenches to clog up. This picture was taken in a little glass case that I arranged for the purpose. Mosquitoes in this state very frequently live over winter. Some kinds of "wigglers" can be literally frozen up without harm. They are frequently found in the leaves of the pitcher plant during the winter, frozen solidly in icy balls. Last January I found some active "wigglers" in pools of water under the ice, although the thermometer had been for a week about 30 below zero. I will speak of these again, and tell you more about them.

Now we are looking at an individual *Culex* larva and an individual *Anopheles* larva, and you will see that they are very distinctly different one from the other. Here we have a *Culex* larva at the top of the water. *Culex* does not stay at the surface much of the time, but it comes occasionally to the top to breathe, which it does through its respiratory siphon, or breathing tube. It thrusts this tube up into the surface of the water, gets a breath of air, and goes down again to feed. The *Anopheles* larva, on the other hand, unless it is frightened, stays at the surface nearly the entire time. It breeds there, and it feeds there. It lies, as you see, parallel to the surface of the water. Its breathing tube is very short; you can hardly see it here at all, but it is located here in the tail. And here is the head. The

two varieties are distinctly different in every way, as they are through all the phases of their life history. They must have air, or they cannot breathe and cannot live, and that is why it is that kerosene is so deadly to them, because it shuts off the air when they come to the surface to breathe. I will speak of this again later.

After a few days they change from larvæ into pupæ, and this picture shows the third stage. Here we have a *Culex* pupa, and here an *Anopheles* pupa. The pupæ are distinctly different. Although you cannot see the difference in this photograph, still with the naked eye you can see it very easily. I will point out the difference to you in a few minutes in a picture which is to follow. This stage is simply a resting one, the insect doesn't feed at all now. It stays at the surface nearly all the time, breathing through these little trumpet-shaped breathing tubes situated at each side of its thorax or head; there are two now instead of one as before in the larva. It remains quiet until the time comes when it is going to emerge as an adult insect. Finally, it begins to split up the back, and the full-grown insect comes forth just as you will see it in the next three pictures. A mosquito never grows after it comes from the water. We frequently hear it said, "We have some small mosquitoes now that later will be larger," but they won't. A mosquito never grows after it is able to crawl and fly. It is then the size that it is always going to be.

This picture, while it is taken from life, does not represent a normal position, because this insect was inside of a little glass cell that was only about an eighth of an inch wide. The insect, which is a female, is putting its feet up and is pulling itself out on the glass. Really it is upside down. In nature it would be turned round the other way, and would be resting with its feet on the water.

In the next picture you will see that the insect has turned over and is now in its proper position, the position that it would assume in nature. It now has its feet upon the surface of the water and is pulling itself out. Notice its tremendous size. It does not seem possible that it could have come out of that little shell, which you see has been left in the water. This is the criti-

cal time in the life history of a mosquito. If the wind should blow enough to ripple the surface on the water, the insect would be upset and would be drowned. So you see it is very important that it should seek some quiet pool where the wind cannot disturb the surface. We won't find mosquitoes in ponds where the surface is free from weeds and where the edges are abrupt; even if it is a pond only the size of this building you would hardly find any mosquitoes in it, because it does not offer any shelter for them. They must have some quiet place, some little pool or some little nook in a big pond where there are weeds or rushes, or something of that kind to keep the wind away. It only requires about seven minutes from the time that the pupa begins to split up the back until the adult mosquito has come out, has dried its wings, and is ready to fly away, and, if it is a female, ready in a short time to deposit two or three hundred more eggs, which mean trouble in future for us.

Here in this picture you see the empty pupa skin. Let us stop for a minute to look at these empty skins, for by them you can often tell whether or not mosquitoes have been breeding in a pool where they are not present when you are looking in it. These skins keep intact for a long while. They float at the surface of the water. We can now see their respiratory siphons, and see the difference in their shapes. These which you will see are quite flary, or trumpet-shaped, are *Anopheles*. These which are long and slender, are *Culex*. They can be easily told by these distinctive features, the difference in the shape and size of their breathing tubes.

This picture shows *Anopheles punctipennis*. This is one of the malarial group that we have very commonly about here. I want to call your attention to its spotted wings, which are very prominent, and also to the fact that this insect has its bill or its proboscis, and its body, all in one straight line. It is a female mosquito. I will call your attention to the antennæ, which are very small. You will see how different are those of the male in the next picture. These mosquitoes, when they alight, don't search round for a favorable place to bite. Generally they come down bill first and get to work at once, and in a few minutes you

feel a pricking sensation. That pricking sensation is the result of a definite purpose. When the mosquito bites it injects saliva or poison into our flesh in order that the blood shall become thinner, so that the mosquito won't have to work so hard to pump it out. If it is a malarial mosquito, one of the kind that is able to carry malaria, and it has, at the right time, bitten a person who is ill with malaria, when it injects this poison or saliva into the blood the plasmodium of malaria goes with it. It seems very simple now that we know how it is done, and rather queer that we did not think of it before, because, as you all know, malaria is essentially a disease of the blood. Under a microscope you can see these little plasmodia in the red blood corpuscles. They are drawn into the stomach of the insect, and they eventually get all over the body cavity, and into the salivary glands, where they are thrown out with the saliva into the blood of the next person that is bitten, and there the cycle is completed. It seems all very simple now that we know about it.

The next picture shows you a male of this same species, and now you can see the distinct difference. The antennæ here are very much more prominent. This fellow has moustaches, or whiskers, as it were. The male mosquito is the best chap in the world. He only lives a short time, and then he passes away. He does not bite; all that he does is just to sing and enjoy himself.

The next picture shows you the typical resting position of *Anopheles punctipennis*. *Anopheles maculipennis* does not assume quite such an angle as this one does, but still it assumes very much more of an angle than does the *Culex*, as you will see in the pictures to follow. You will see that this insect's body and its proboscis are all in a straight line, as I have said before.

In this picture you see the ordinary, every-day *Culex pungens*. It is a hump-backed, miserable looking insect, but it is a very annoying one nevertheless. You will notice that the proboscis and the body are at an angle; they are not in a straight line, as they were in *Anopheles*.

The mosquito breathes through numerous little holes on both

sides of its body. In speaking of a mosquito's breathing, I want to tell you of a very good way to rid yourselves of mosquitoes if they trouble you when you sit out on the piazza in the evening. It is by the use of Pyrethrum powder, which is commonly sold in drug stores under the name of Persian Insect Powder, and sometimes under the name of Dalmatian Powder. By burning this powder in the evening you can enjoy comfort on the piazza, where otherwise you would not be able to endure the mosquitoes. The smoke from this powder stops up the little holes through which the mosquitoes breathe, and smothers them. It is an excellent thing to burn in our cellars in the winter when mosquitoes are hibernating there. Pyrethrum smoke has rather a pleasant odor. The powder may be bought for from twenty-five to thirty-five cents a pound, and a little of it goes a long way. The easiest way to start the smoke is to get a live coal out of the kitchen stove, place it on a small shovel and sprinkle a little of the powder on it. It will immediately begin to smoulder, and no mosquitos will stay where this smoke is present. Now and then one may make its appearance; but they won't stay to annoy you. During the tremendous plague that we have just had I have been able to sit out on my piazza in comfort in the evening when burning this powder.

Here we have a male *Culex pungens*, and now again you see the characteristic resting position of this species. You may perhaps be interested to know how I took these photographs, and so I will tell you something of my method. I made a small glass cage, two or three inches square. Here is one in reality. (holding up a small glass box) and it has some live mosquitoes in it. I will show them to you later. I placed the mosquitoes in this little glass cage, and there I photographed them. It was not always easy to make them sit still and look pleasant. They were generally flying around. I had to work pretty quickly, and take a good many snap shots before I got any satisfactory pictures. I well remember one day in the fall I had a particular mosquito I wanted to photograph, I forget what species of *Culex* it was, and it was the most persistently uneasy thing I ever saw in my life. It flew all over the cage and would not keep quiet. So I

went into the house and got some ether, and put a drop or two in the box, thinking that this would quiet the insect. It worked nicely, too nicely. The mosquito kicked up its feet and laid on its back perfectly still. I looked round for half an hour, trying to find another specimen, then gave it up, came back and found the mosquito had come to life and was flying round again just as lively as ever. I now put the restless insect into an ice-cream freezer. I must have left the mosquito in too long, for when I removed the cover it was frozen stiff and was again on its back with feet in air. To make a long story short, this hardy mosquito thawed out, came to again, and was as busy as ever, and in putting it back into the glass cage, it got caught beneath the cover. This settled it, for its back was broken.

I had no trouble in making the mosquito which you see in this picture stay still as long as I wished. You can see it was full of blood; it had bitten me a few moments before. It stayed perfectly still for two hours and allowed me to photograph it in every position.

Now we are looking at *Anopheles maculipennis*, the mosquito that is known to carry the plasmodium of malaria. It corresponds identically to the one upon which so much work has been done in Italy. It is commonly said that these mosquitoes bite only at night, but I know that this is not so. I have been bitten by them at all times of the day, and a person does not want to go about feeling sure that he is not going to get bitten during daylight.

Now we will look at some places where mosquitoes are liable to breed, also at some places where they are not liable to breed. You might say this was a place where they would breed, but it is not. The surface of this water is covered with Lemna, or duck weed, and it covers the surface so thickly that mosquito larvæ cannot get through it to breathe. This picture, and the four that follow, were taken out on the Fresh Pond marshes (you probably all know where they are; the Fitchburg road goes over them after it leaves Cambridge). There are some six or seven hundred acres in this swampy area.

This view shows a place that is favorable for the breeding of

mosquitoes. This pool was located in Belmont. I say "was located," for it no longer exists. Two or three years ago, you will remember, I talked to you about the draining of marsh lands, and showed some of these photographs. The Board of Health of Cambridge and the Board of Health of Belmont co-operated, and at an expense of $1,600 we drained off about three feet of water from this very spot. This picture was taken in July, in one of the driest seasons that we had for years. This next picture of the same place was taken in the following December, after a very rainy season. Three feet of water have disappeared. This is what draining did in that locality. We drained and reclaimed about seventy-five acres of land that were under water and unfit for anything but raising mosquitoes. There is still much more work to be done in the lower section of this marsh territory.

This photograph shows you the location as it is today where no draining has been done. This view is right back of the Boston Packing and Provision Company's plant on Concord Avenue. The Fitchburg road goes by on this side. I can remember when I was a boy that a grove of maple trees stood there, and I used to go to this pond to shoot wild ducks. The water has come up there now so that it has killed off the trees; it is full a foot higher than it used to be twenty years ago. This is because the brooks that drain the marshes were not properly taken care of, and because the swampy area is situated in four different municipalities, and what was everybody's business was nobody's business. But this is all going to be changed. During this last session of the Legislature a special act was passed authorizing the cities of Cambridge and Somerville and the towns of Arlington and Belmont to clean out and straighten the channels of Alewife Brook, which drains this territory, and tide gates are to be put in where the brook enters Mystic River. A commission has been appointed to do this work, and by these means we hope to drain off two feet and a half more water from this district.

Here is another picture that shows conditions just as they exist today. You can see this very spot out of the car window as you go out on the Massachusetts Central track. Here is the Fitchburg Railroad, and here are the buildings of the Boston

Packing and Provision Company, and this is Alewife Brook, which often flows one way and then another, and then does not flow at all. Within half a mile of the Fresh Pond marshes, where mosquitoes are breeding by the thousand, there are 1,100 dwelling houses, 100 of them in Belmont, 200 in Arlington, 300 in Somerville, and 500 in Cambridge.

This is the principal work that the Belmont Board of Health has been doing out in our section to regulate the mosquito nuisance. We are getting these marshes cleaned up. In our town we have not had very much money to spend in petrolizing or draining, but we have tried to get individuals interested to do this work upon their own places, and we hope that we are succeeding in a measure.

This is a photograph of a ditching machine. I have not seen this machine in operation, but I have read a good deal about it. It is owned and patented by a man named Mark B. True of Newburyport. He contracts to make ditches with it, and can dig from 40 to 100 yards a day, making a ditch from four to eight inches wide, and from two to three feet deep, as occasion requires, and he charges ten cents a rod for doing the work. This is an excellent machine to use when draining marshy land, because it can do quick work. It makes narrow ditches, straight up and down, ditches that can be easily taken care of. It is very important after these ditches are made that they should be kept cleared out, because if they stop up they are worse than no ditches at all, for then they offer very favorable places for Anopheles to breed in.

Here is a ditch in Belmont, on a farmer's land. It was dug to drain his celery patch, and he let the water accumulate, and did not take pains to see that it was kept clear. Thousands of mosquitoes, of *Anopheles*, were breeding in this ditch all unknown to him. That is an excellent place to use petroleum or kerosene, and a very few ounces of it will suffice, all that is necessary to use is an ounce to fifteen square feet. A very few ounces placed on this ditch would do away with all the mosquitoes there. Of course it is very important that it should be renewed at intervals of about two weeks.

Now I am going to show you the effect of kerosene upon

mosquito wigglers. We hear a good many laughable comments about mosquitoes living on oil, and what oil does to mosquitoes, and all that. There is a good deal of fun made of it, but it is a very practical thing if used in the right way. This picture will show you the way it works. Here is the film of kerosene, up above this point, and this is all water below. Of course this is very much more oil than you would get by applying an ounce to fifteen square feet. Here are the larvæ of *Culex* coming up and trying to breathe. You see this one thrusting its tube up into the kerosene, trying to get air, and you see these two are going down to the bottom. They are ready to give up the fight. At once, or generally within a few seconds, when it gets the end of its breathing tube stopped up with kerosene, the wiggler frantically grasps its respiratory siphon with its mandibles, and vainly tries to pull off the oil. It is a most pleasant thing to watch, I can assure you, and I think that even the Society for the Prevention of Cruelty to Animals would stand by and say not a word if they saw these experiments being made. (Applause). They struggle, and they gasp, and within a few minutes go down to the bottom to die. Anyone can make this experiment for himself. He can get a few "wigglers," put them in a tumbler, put a few drops of kerosene on the water and see what happens. He can see whether or not this method of dealing with the mosquito nuisance is efficient.

There may be some places that we don't want to put kerosene upon. There may also be places that we don't want to drain. I have a lily pond that I constructed on my place some ten years ago, before we knew very much about mosquitoes, except that there were such troublesome things in the world. I dug this pond in a meadow in order to drain the land to get all the water in one place, and I planted lilies and put a lot of gold fish in the pond. When I became a member of the Board of Health, and it came to be known that mosquitoes were responsible for malaria, I thought I would have to do away with this pond, for it seemed to be an ideal place for mosquitoes to breed in. I did not want to treat it with kerosene, for I thought the oil would kill the gold fish. I went down to the pond to look for mosquito

"wigglers," and was much surprised, when, after a careful search, I could not find any. It seemed rather queer that there were no larvæ in the pond, for within twenty feet of it was a slow-running brook, and here, in and about the numerous patches of weeds that were growing in the water, I found a great many "wigglers," both *Culex* and *Anopheles*. Why were there none in the pond where the conditions were so favorable for them? I suspected that the gold fish had something to do with it, so I caught two of them and placed them in a glass tank, and in the water I put some mosquito larvæ. Within five minutes I had the pleasure of seeing these two fish that you are looking at on the screen (they were not more than three inches long) eat ninety-eight "wigglers" in four minutes. This settled the question for me. My pond was not touched and I have never been troubled with mosquitoes from it. The brook was easily fixed; it was simply a question of keeping it clear of the weeds that offered a shelter for the mosquitoes in their early stages.

A great many people don't know that gold fish will live naturally in many of our ponds hereabout, especially in small ponds, where the water is shallow and warm. This pond of mine has only an average depth of about two feet, and it freezes almost to the bottom every winter, and yet the fish multiply in it. There are other fish that do this same thing. Our friend Dr. Abbott, once told us, I remember, that when he was a boy there was a certain rain-water barrel that he was interested in, where an old hornpout used to swim around, and he observed that during the evening this hornpout would come up to the surface and with cavernous mouth would take in thousands of mosquito "wigglers."

The "top minnow," the roach, the sunfish or "pumpkin seed" all play an important part in reducing the numbers of mosquito "wigglers." Besides the fishes, there are other "foes of the water" that prey upon the mosquito larvæ. Many of the predatory water bugs feed upon them.

In this connection a brief description of a newly discovered mosquito, to which has been given the name *Eucorethra underwoodi*, should be of interest, since it has been found that their

larvæ devour the wigglers of other mosquitoes, and unlike other mosquitoes, the adult female insect does not bite. As the proboscis of this insect is so formed that it cannot puncture the skin, it should not perhaps be called a true mosquito, though it has been classed as one, since it belongs to the family Culicidæ.

The larvæ of this insect were found by the author on January 27, 1903, in the Maine woods in the eastern section of Penobscot County, and were discovered in a spring of water from which a crew of lumbermen were getting their water supply. A few days later, other larvæ of the same species were found in a similar spring about eight miles distant, though in this case, as the spring was not in use, its surface was covered with a coating of ice about an inch thick. The temperature of the water at the bottom (it was about two feet deep) was 42° F.

At first sight this larva would be taken for an *Anopheles* of extraordinary size, as it is of the same general shape, and when the water was cleared of ice, it lay just beneath and parallel to the surface, breathing through a short respiratory siphon, as is characteristic of the larvæ of *Anopheles*. In this spring a barrel had been sunk and in the fifty gallons, or thereabouts, of water which it contained there were twenty-five larvæ. They were all of about the same size—12 to 14 mm. long—and almost black in color. All were secured and taken into camp for further investigation.

Close observation of the larvæ showed that besides being much larger (12-14 mm. long instead of 5-7 mm.) they differed in many other particulars from the larvæ of *Anopheles*. In proportion to the rest of its body, its head is larger than the head of *Anopheles*. It does not turn its head upside down when feeding as does *Anopheles*. Its mandibles are strikingly large and powerful, and are prominently toothed. It lacks the frontal tufts or brushes which are conspicuously present in *Anopheles*, and its antennæ, which extend directly forward parallel with the sides of the head, are much longer and more slender, and are tipped each with three hairs of equal size. The thorax is broadly elliptical and is much wider in comparison with its abdominal segments than is the thorax of *Anopheles*. The sides of the thorax and the abdominal segments bear fan-shaped tufts of hairs, not plumosed as in

Anopheles. The tufts on the last segments, both dorsal and ventral, are more profuse in *Eucorethra* than in *Anopheles*, especially the ventral tuft which in *Eucorethra* occupies nearly the whole segment. Only two anal papillæ are present, while *Anopheles* has four.

A few days before the author returned to Boston several larvæ died, and three changed to pupæ. The pupa resembled that of *Culex* rather than of *Anopheles*, and its respiratory siphons are of the same shape as those of *Culex*. When stretched out at full length, the pupa measures ten mm.

On reaching home, the new wigglers, eighteen in number, were put into a quart jar which was placed near a window where it would receive the sunlight for two hours each morning. The temperature of the water now averaged about 70° F. and with this change the larvæ developed a new trait—they began to eat each other up. The act was witnessed on several occasions. The larva would grasp its adversary just forward of the respiratory siphon with its powerful mouth parts, and working the tail in first it would gradually swallow its victim, shaking it now and then as a terrier would shake a rat.

After losing many of the insects in this way, those that remained were separated, and each individual was placed in a small bottle by itself. Eventually, I succeeded in rearing a number of males and females. The pupal stage of this insect varies from five days and nine hours to six days and ten hours. The adult resembles *Anopheles* in having maculated or spotted wings, but is much larger and measures eleven millimeters in length. Its mouth parts, however, are not adapted for biting. A full description of the imago is soon to be recorded by Mr. D. W. Coquillett, of the National Museum, by whom the name above mentioned was given.

During a visit to Maine in June, a large number of larvæ of *Eucorethra* were taken from the spring where the barrel had been sunk. It was noticeable that larvæ of other kinds of mosquitoes were absent, although the adults were very numerous in the immediate vicinity.

The absence of other mosquito larvæ was accounted for when

later it was discovered that the larvæ of *Eucorethra* fed upon the larvæ of other mosquitoes, eating them apparently with great relish. On several occasions fourteen *Eucorethra* larvæ ate, during the night, sixty *Culex* larvæ out of the seventy that had been placed in the water with them. When eating the larvæ of mosquitoes smaller than themselves, the victim is caught, shaken violently a few times, and swallowed in a few seconds, in very much the same way that a pickerel would catch and swallow a smaller fish.

As yet no experiments have been made to see if this new species will devour the larvæ of *Anopheles* as readily as they will those of *Culex*. Whether or not this species will thrive in the climate of southern New England is as yet uncertain, but experiments are now being carried on to determine this point.

Although myriads of mosquitoes are destroyed by the natural enemies which have been mentioned, man should be the most destructive foe of these insects. There is no doubt that the mosquito pest may be very largely abated by the employment of scientific methods for causing its destruction in the early stages of its development.

While it is the duty of boards of health to recognize mosquitoes as active agencies for the dissemination of certain diseases and to take such measures as are possible for their extermination, the work can never be effectively done until the people of each community are fully informed in regard to the life history of the mosquito so that all may co-operate intelligently to secure its destruction.

I would like to pass round a bottle containing the larvæ of this new mosquito. Before I pass it round, I will pour into it a lot of Culex "wigglers." If you will look closely you will probably see, as it passes from hand to hand, this new mosquito engaged in the work of destroying these "wigglers." You can see the difference in size between the two. Most of the *Eucorethra* larvæ are down at the bottom just at present, but in a few minutes you may see them reach out and catch the ordinary "wigglers," and eat them up.

(Members gathered around Mr. Underwood as he displayed his specimens, and examined them critically.)

Program of Next Meeting—Summer Diarrhea,—*Hastings*, Metropolitan Water Supply,—*Walcott*. At Clinton, Mass., Oct. 22, 1903.

ABSTRACTS, REVIEWS, NOTES AND NEWS.

FOURTH OF JULY CASUALTY LIST—The Journal of the American Medical Association, published August 29th, 1903, the results of an investigation showing that 466 persons were killed and 3,983 persons injured by accidents due to explosives used in celebrating the Fourth of July in the current year. Of the deaths, 406 were due to the terrible disease of tetanus (lock-jaw). Of the injuries, loss of sight constituted 10 cases, loss of one eye, 75; loss of legs, arms or hands, 54; loss of fingers, 174; and other injuries 3,670. The blank cartridge provided 363 tetanus cases and 1,309 cases other than tetanus. These figures were obtained from the newspapers of the country. The deplorable suffering and death here recorded occurred in spite of the very general warnings and urgent advice given to the public this year by the medical and lay press, as well as by various city authorities. Boards of Health are urged to co-operate in doing away with this annual holocaust by the careful collection and publication of the data relating to deaths from tetanus, especially those from explosives. It is worth noting that only ninety-five deaths from tetanus after vaccination have been collected from all medical literature. (MacFarland, Journ. Medical Research, VII., 1902.)

THE QUESTION OF TETANUS BACILLI IN BLANK CARTRIDGES—The lay press has of late informed the public of the alleged discovery of tetanus bacilli in blank cartridges by the bacteriologist of Newark, N. J. It now appears, according to the Journal of the American Medical Association, that the bacteriologists' report was based on examinations of cartridges made without inoculation tests in animals. There is good reason, therefore, to consider his findings not proven, especially in view of the fact that other investigators, working with animals in different places and at different times, have uniformly failed to

find tetanus bacilli in such cartridges. Two of these investigators report finding bacilli which, in the absence of animal experiments, might have been mistaken for tetanus bacilli. It still remains probable therefore, that tetanus following blank cartridge wounds is due to the character of the wound and infection of the wound with extraneous dirt, rather than to the infection of the cartridge itself with tetanus bacilli.

NEW VACCINATION LAWS IN FRANCE—In February, 1903, there went into effect in France a law holding parents and guardians personally responsible for the vaccination and re-vaccination of children in their first, eleventh, and twenty-first years. Bovine vaccine matter, prepared under the supervision of the government, is prescribed—to be transferred directly from the heifer to the arm when possible, or used in the form of a glycerinized pulp.

The laxity regarding vaccination in France heretofore has therefore now been replaced by rigid requirements similar to those which have made smallpox almost unknown to the next-door neighbor, Germany. Evidently, France has at last learnt wisdom by experience.—Abstract from Boston Medical and Surgical Journal, October, 1903.

COMPULSORY VACCINATION CONSTITUTIONAL IN MASSACHUSETTS—In April, 1903, in the case of Commonwealth v. Pear, the Massachusetts Supreme Judicial Court handed down an opinion, holding the statute authorizing compulsory vaccination constitutional. The case grew out of the refusal of the defendant to submit to vaccination at the hands of the Cambridge Board of Health, the Board having complied with the statute in all particulars in the making and carrying out of an order for the vaccination and re-vaccination of all persons under their jurisdiction not successfully vaccinated since March 1st, 1897.—(Condensed from the Review and Record & Banker and Tradesman, of April 18th, 1903, where the opinion is given in full.)

THE BOSTON ASSOCIATION FOR THE RELIEF AND CONTROL OF TUBERCULOSIS, recently organized in Boston, has for its object the teaching of the public, through lectures and circulars, and particularly through district nurses sent into the homes of tuberculous patients, concerning the communicability and the prevention of tuberculosis. Boards of Health welcome these efforts, since such work covers certain fields which they cannot so well do. Particulars can be obtained from the Secretary, Harold K. Estabrook, Room 47, 43 Hawkins St., Boston.

GENERAL HEALTH OF THE STATE—From advance sheets of the Annual Report of the State Board of Health for the year 1902, we learn that the death-rate of the State for that year was the lowest ever recorded in the history of the State, namely, 16.17 per 1,000 in an estimated population of 2,937,600, that of the two previous years, 1900 and 1901, having been respectively 18.2 and 16.8 per 1,000. A very decided fall in the mortality from consumption and from other infectious diseases appears to have been one of the chief causes of this unusually low death-rate.

The Massachusetts Institute of Technology has recently established a laboratory for the study of sewage disposal under the directorship of Professor William T. Sedgwick. The laboratory is situated at 786 Albany Street, Boston, opposite the South Department of the City Hospital, on the line of Boston's largest main sewer. The opportunity for the study of the sewage of a city of the first rank is believed to be unique. Some interesting work on the bacterial contents of Hospital sewage is, we believe, in contemplation. A full description of the laboratory is given in The Technology Review, July, 1903.

Mr. C. E. A. Winslow, of the Massachuetts Institute of Technology, has contributed to "Science" (July 29, 1903), a review of the statistical arguments for and against vaccination, concluding that the protection afforded by vaccination is absolutely proved

by the evidence examined. No one who has had practical experience with smallpox asks for statistical evidence in its favor, but to the laity only evidence of this character can usually be made available.

For the treatment of fresh wounds of such a nature as to make requisite specific provision against the later development of tetanus, Calmette has recently advised dusting with dried tetanus antitoxin. This, done within a few hours of the injury, is an almost perfect safeguard. MacFarland has recently repeated Calmette's experiments and confirmed his results.

The vaccine plant of the Massachusetts State Board of Health is under construction at the Bussey Institute, Forest Hills, Boston. Dr. Theobald Smith, who is in charge, has recently returned from a trip to Europe, which included visits to the chief vaccine establishments in the old world.

Professor Loeffler of Greifswald has reported to the German government that a protective serum against foot and mouth disease is now available for cattle, and advises the immunization of all cattle brought into the market with the serum.—(Am. Med., Sept. 26, 1903.)

The New York Board of Health has ceased to produce diphtheria antitoxin or vaccine for sale. It will hereafter supply only the City of New York. Such supplies will of course be free as heretofore.

List of Members — Continued.

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William W. Scott. 2
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Palmer

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F. F. Wesbrook, M. D.
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